General

Guideline Title

ACR Appropriateness Criteria® hematuria.

Bibliographic Source(s)

Shen L, Raman SS, Beland MD, Moreno CC, Goldfarb S, Harvin HJ, Heilbrun ME, Heller MT, Nikolaidis P, Preminger GM, Purysko AS, Taffel MT, Vikram R, Wang ZJ, Weinfeld RM, Yoo DC, Remer EM, Lockhart ME, Expert Panel on Urologic Imaging. ACR Appropriateness CriteriaÂ® hematuria [online publication]. Reston (VA): American College of Radiology (ACR); 2014. 8 p. [36 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Ramchandani P, Kisler T, Francis IR, Casalino DD, Arellano RS, Baumgarten DA, Curry NS, Dighe M, Fulgham P, Israel GM, Leyendecker JR, Papanicolaou N, Prasad S, Remer EM, Sheth S, Expert Panel on Urologic Imaging. ACR Appropriateness Criteria® hematuria. [online publication]. Reston (VA): American College of Radiology (ACR); 2008. 5 p. [37 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

ACR Appropriateness Criteria®

Clinical Condition: Hematuria

Variant 1: Patients with vigorous exercise, presence of infection or viral illness, or present or recent menstruation.

Radiologic Procedure	Rating	Comments	RRL*
US kidneys and bladder retroperitoneal	3		O
CT abdomen and pelvis without and with contrast	2		☢☢☢☢
CT abdomen and pelvis with contrast	2		☢☢☢☢
CT abdomen and pelvis without contrast	2		☢☢☢☢
X-ray intravenous urography	2		☢☢☢
MRI abdomen and pelvis without and with contrast	2		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			***Relative**

Radiologic Procedure	Rating	Comments	RRL*
MRI abdomen and pelvis without contrast	2		O
X-ray retrograde pyelography	1		☢☢☢
Arteriography kidney	1		☢☢☢
X-ray abdomen and pelvis (KUB)	1		☢☢
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			***Relative Radiation Level**

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 2: Patients with disease of renal parenchyma as the cause of hematuria.

Radiologic Procedure	Rating	Comments	RRL*
US kidneys and bladder retroperitoneal	8		O
X-ray retrograde pyelography	2		☢☢☢
CT abdomen and pelvis without and with contrast	2		☢☢☢☢
CT abdomen and pelvis with contrast	2		☢☢☢☢
CT abdomen and pelvis without contrast	2		☢☢☢☢
MRI abdomen and pelvis without and with contrast	2		O
MRI abdomen and pelvis without contrast	2		O
Arteriography kidney	1		☢☢☢
X-ray abdomen and pelvis (KUB)	1		☢☢
X-ray intravenous urography	1		☢☢☢
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			***Relative Radiation Level**

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 3: All patients except those described in variant 1 or 2.

Radiologic Procedure	Rating	Comments	RRL*
CT abdomen and pelvis without and with contrast	9	CT urography. Must include high-resolution imaging during excretory phase.	☢☢☢☢
CT abdomen and pelvis without contrast	6		☢☢☢☢
X-ray retrograde pyelography	6	For patient with contraindication to iodinated contrast or strong suspicion of urothelial lesion, to clarify abnormality suspected on CT or IVU.	☢☢☢
CT abdomen and pelvis with contrast	5	This procedure may be appropriate, but there was disagreement among panel members on the appropriateness rating as defined by the panel's median rating.	☢☢☢☢
US kidneys and bladder retroperitoneal	5		O
MRI abdomen and pelvis without and with contrast	5	MR urography. For patients with contraindication to iodinated contrast.	O
MRI abdomen and pelvis without contrast	4		O
Arteriography kidney	2		☢☢☢
X-ray abdomen and pelvis (KUB)	2		☢☢

Radiologic Procedure	Rating	Comments	RRL*
X-ray intravenous urography	1		☢☢☢
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			***Relative Radiation Level**

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Summary of Literature Review

Introduction/Background

Hematuria is one of the most common presentations of patients with urinary tract diseases and of patients referred for urinary imaging. This review summarizes practice for the radiologic approach to such patients. It is limited to adults and does not refer to patients whose hematuria coexists with other clinical situations reviewed in other American College of Radiology (ACR) Appropriateness Criteria® topics, including acute trauma, infection, renal failure, symptoms of acute stone disease, known renal masses, and prostatism. It is also limited to initial tests; follow-up of normal or abnormal first tests is beyond its scope.

The initial decision to be made is whether all patients with any degree of hematuria need imaging evaluation. Hematuria can originate from any site in the urinary tract and be due to a wide range of causes, which can be roughly divided into renal, urothelial, or prostatic causes. Thorough evaluation of gross hematuria is usually recommended, and this is usually done with a combination of clinical examination, cystoscopic evaluation, and urinary tract imaging. Patients on anticoagulants who present with gross or microscopic hematuria have a sufficiently high prevalence of important disease including tumors that workup cannot be forgone.

Microscopic Hematuria

In comparison to gross hematuria, the situation is somewhat different in patients with microscopic hematuria. The recommended definition of microscopic hematuria is three or more red blood cells per high-power field on microscopic evaluation of urinary sediment from two of three properly collected urinalysis specimens. Patients with no detectable abnormalities in their urinary tracts may release small amounts of blood into the urine, so that several red cells per high-power field may be seen upon microscopic examination of the spun sediment.

The low prevalence of clinically detectable disease in some groups of patients with asymptomatic microscopic hematuria has led some investigators to suggest that minimal microhematuria in an asymptomatic young adult needs no evaluation. Unfortunately, no threshold number of red blood cells per high-power field has been found that separates patients with clinically important disease from those with no detectable urinary tract abnormalities.

As alluded to above, hematuria can be due to a wide variety of causes such as calculi, neoplasms, infection, trauma, coagulopathy, etc. In patients with risk factors such as cigarette smoking, occupational exposure to chemicals, irritative voiding symptoms, a full urologic evaluation for urothelial carcinoma is recommended if even one urinalysis documents the presence of at least three red blood cells per high-power field.

There may be specific circumstances in which complete radiologic workup of microscopic hematuria is unnecessary. Young women with a clinical picture of simple cystitis and other patients whose hematuria completely and permanently resolves after successful therapy are unlikely to benefit from any imaging. Patients who have a disease of the renal parenchyma (which include glomerulonephritis, glomerulonephropathy, acute tubular necrosis, and acute kidney injury) also constitute a special group. A thorough urinary analysis should be the initial workup in this population. Although such patients should have renal ultrasound (US) to evaluate the kidneys for coexistent morphologic abnormalities, an extensive workup to exclude a mass that may be the cause of the hematuria is thought to be unnecessary. In patients with recent history of infection or viral illness, vigorous exercise, or urological procedures such as catheterization, initial imaging workup is also not beneficial. Chronic hematuria in the above populations of patients warrants further workup that probably should include imaging.

In situations of recent trauma, patients with minor blunt trauma may not need imaging initially, but penetrating or major trauma will definitely warrant some imaging early. In the setting of trauma, please see the National Guideline Clearinghouse (NGC) summary of the ACR Appropriateness Criteria® suspected lower urinary tract trauma.

Imaging Evaluation

Imaging evaluation is recommended for all other adult patients with hematuria to detect urologic malignancies as well as the other possible causes of hematuria mentioned above. A complete history, physical examination, urine analysis, and appropriate serologic tests such as antinuclear antibody (ANA) and double-stranded DNA (dsDNA) should precede or accompany the imaging examinations. The imaging evaluation will almost always be accompanied by cystoscopy to evaluate the urinary bladder, since many bleeding urinary tract lesions arise in the urinary bladder, and

imaging procedures are not yet conclusively proven to be as sensitive as cystoscopy in diagnosing most of them. Multi-detector-row computed tomography (CT) has been evaluated in detecting bladder cancers, and reports suggest a sensitivity and specificity of 95% and 92%, respectively. One retrospective study reports that computed tomography urography (CTU) and cystoscopy had similar diagnostic accuracy for detection of bladder cancer in patients with hematuria alone; however, cystoscopy remains superior in patients with prior urothelial malignancy.

Computed Tomography

Until the mid-1990's, excretory urography (IVU) was the imaging study used in evaluating hematuria, but development of multidetector CT and the excretory phase CT urogram, also known as CTU, have supplanted IVU over the past 15 years. Compared to CT and US, IVU has low sensitivity for detecting renal masses <2-3 cm in size, and even if a mass is visualized, further cross sectional studies such as US, CT, or magnetic resonance imaging (MRI) are then necessary to characterize the mass. In one prospective study that compared CT and IVU in the same patients with microhematuria, radiographic abnormalities were noted in 38 patients; sensitivity and accuracy of CT were 100% and 98.3% compared to 60.5% and 80.9% for IVU. Fewer additional radiographic studies were recommended after CT than after IVU in the experience of these authors. Another prospective study that compared CT and IVU in different patients with hematuria found that CTU had higher sensitivity than IVU for detecting upper tract pathology (94.1% versus 50%), but both imaging modalities had low sensitivities (40% or less) for detecting lower tract lesions.

Dual energy, split bolus CT protocol that provides virtual noncontrast, parenchymal and urographic phases in a single scan is being researched, but its benefits are unclear at this time.

Ultrasound

US still has a role in the initial workup of hematuria to search for bleeding urinary tract lesions. It is especially useful in radiation-sensitive populations, such as children and pregnant or child-bearing age women, to detect renal calculi and renal masses. In patients in whom glomerular disease is the cause of hematuria, US can examine the renal parenchyma and follow disease progression. US can evaluate length, quantitative echogenicity, cortical thickness, and parenchymal thickness. One study showed that echogenicity correlated the strongest with histological parameters that include glomerular sclerosis, tubular atrophy, interstitial fibrosis, and interstitial inflammation. In a prospective study, US had higher sensitivity (96% versus 25%) and negative predictive value (98% versus 91%) than IVU in detecting abnormalities of the upper urinary tract in patients present with hematuria. Therefore, US should replace IVU for first-line screening of the upper tracts in radiation-sensitive populations and patients with glomerular disease as the cause of hematuria. However, in comparison to cross-sectional imaging modalities such as multidetector CTU or magnetic resonance urography (MRU), US has lower sensitivity in detecting urinary tract abnormalities. Another prospective study of 841 hematuria patients who had CTU or MRU showed no significant upper urinary tract lesions in 86.1%. US was a significant predictor of the final CTU/MRU result; that is, US can be used as an initial screening tool and can triage patients who need further cross-sectional urography. For the majority of patients with hematuria, multidetector CTU remains the best overall imaging modality due to its widespread availability, ability to detect a range of possible causes including small renal masses, calcifications and stones and ability to image the upper tract collecting system. MRU is a reasonable alternative for detection of small renal masses but is poor for detection of calcifications and small stones. In patients who have contraindications to CTU or are sensitive to radiation, or who have a very low risk of having a malignant cause of hematuria, US is the first-line imaging modality. One study has shown that three-dimensional (3D) US improved accuracy of detecting bladder cancer compared to two-dimensional (2D) US, especially for small lesions.

In patients with medullary sponge kidney disease and papillary necrosis, US can be used as an initial imaging study and subsequent follow-up study for progression.

Intravenous Urography and Retrograde Pyelography

The detection of urothelial lesions in the upper tracts was traditionally performed with IVU and/or ureteroscopy along with cystoscopy. CTU has largely supplanted IVU for imaging the upper urinary tract; images are acquired prior to contrast administration and then during nephrographic and excretory urographic phases of enhancement for a complete evaluation for urinary tract stones, neoplasms in the upper and lower urinary tracts, and other pathologies. Reconstructed 3D images can be used to produce IVU-like images in different projections.

Numerous studies have established that CTU is superior to IVU for detecting upper tract urothelial lesions in patients with hematuria. In a meta-analysis, CTU proved to be a very sensitive and specific method for the detection of urothelial malignancy with pooled sensitivity of 96% and pooled specificity of 99%, and was superior in direct comparison to IVU in terms of sensitivity and specificity.

Retrograde pyelography does not rely on renal excretion of intravascular contrast. In patients with impaired renal function, or contraindications to CTU or MRU, or suboptimal CTU or MRU, a retrograde pyelography may be a reasonable adjunct to cystoscopy in patients with suspected upper tract lesions.

Magnetic Resonance Urography

MRU can be performed with or without contrast. MRU without contrast is an excellent technique to demonstrate the cause and level of urinary obstruction, particularly if it is not due to calculous disease. The sensitivity of MRU in detecting urothelial lesions remains under investigation, and at present it is not believed to be the equivalent of either IVU or CTU. However, in patients who cannot receive iodinated contrast material or are radiation sensitive, MRU can be useful. Now there is research to study other sequences such as diffusion-weighted MR imaging in detecting bladder cancer.

MRI and CT have shown comparable accuracy in detection and characterization of most renal lesions. However, with indeterminate renal lesions on CT or complicated cysts, MRI can be useful for better characterization.

Cystoscopy

Although bladder neoplasms can be visualized on IVU, CT, and MRI, cystoscopy is still considered to be the optimal technique to detect the plaque-like lesions of early bladder cancers, although newer studies suggest that a properly performed CTU in an adequately distended bladder is quite sensitive in detecting bladder cancer. CTU as the first study in patients with hematuria may help in the triage of such patients. Patients with no bladder abnormality on CTU can proceed to office cystoscopy, while those with a suspected bladder neoplasm can undergo cystoscopy in the operating room with intent to biopsy.

Other Imaging Studies

Plain radiography of the abdomen and pelvis (KUB) and catheter arteriography of kidneys are not used as first line image modalities for initial evaluation of hematuria. KUB may be useful in patients with history of kidney stones for evaluation of stone size and position and for assessment of stone passage. Rarely, vascular disorders such as aneurysms, arterio-venous malformations or obstruction of a calyx from overlying artery (Fraley's syndrome) may result in hematuria. In these suspected situations, catheter angiography may be useful for diagnosis and for therapeutic interventions.

Summary of Recommendations

- Most adults with gross or persistent microhematuria require urinary tract imaging, with CTU replacing the traditional IVU for this indication.
- Although MRI is an excellent technique to evaluate the renal parenchyma for masses and other abnormalities, it is inferior to CTU and IVU in detection of small stones and urothelial lesions.
- In patients with microscopic hematuria with suspected renal parenchymal disease, renal US may be useful to exclude coexistent morphologic abnormalities. In a few carefully chosen patients with selected indications, no imaging may be necessary.

Abbreviations

- CT, computed tomography
- IVU, intravenous urography
- KUB, kidneys-ureter-bladder
- MR, magnetic resonance
- MRI, magnetic resonance imaging
- US, ultrasound

Relative Radiation Level Designations

Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
O	0 mSv	0 mSv
☢	<0.1 mSv	<0.03 mSv
☢☢	0.1-1 mSv	0.03-0.3 mSv
☢☢☢	1-10 mSv	0.3-3 mSv
☢☢☢☢	10-30 mSv	3-10 mSv
☢☢☢☢☢	30-100 mSv	10-30 mSv
*RRL assignments for some of the examinations cannot be made, because the actual patient doses in these procedures vary as a function of a number of factors (e.g., region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as "Varies."		

Clinical Algorithm(s)

Algorithms were not developed from criteria guidelines.

Scope

Disease/Condition(s)

Hematuria

Guideline Category

Diagnosis

Evaluation

Clinical Specialty

Family Practice

Internal Medicine

Nephrology

Radiology

Urology

Intended Users

Allied Health Personnel

Health Plans

Hospitals

Managed Care Organizations

Physician Assistants

Physicians

Utilization Management

Guideline Objective(s)

To evaluate the appropriateness of various imaging modalities in the investigation of patients with hematuria

Target Population

Adult patients with hematuria

Note: This guideline is limited to adults and does not refer to patients whose hematuria coexists with other clinical situations reviewed in other American College of Radiology (ACR) Appropriateness Criteria® topics, including acute trauma, infection, renal failure, symptoms of acute stone disease, known renal masses, and prostatism.

Interventions and Practices Considered

1. X-ray
    - Intravenous urography
    - Retrograde pyelography
    - Abdomen and pelvis (kidneys-ureter-bladder [KUB])
2. Computed tomography (CT), abdomen and pelvis
    - Without and with contrast
    - With contrast
    - Without contrast
3. Ultrasound (US), kidneys and bladder, retroperitoneal
4. Magnetic resonance imaging (MRI), abdomen and pelvis
    - Without and with contrast
    - Without contrast
5. Arteriography, kidney

Major Outcomes Considered

- Utility of radiologic examinations in investigation of patients with hematuria
- Sensitivity, specificity, and diagnostic accuracy of radiologic examinations

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature Search Summary

Of the 36 citations in the original bibliography, nine were retained in the final document. Articles were removed from the original bibliography if they were more than 10 years old and did not contribute to the evidence or they were no longer cited in the revised narrative text.

A new literature search was conducted in March 2013 to identify additional evidence published since the *ACR Appropriateness Criteria® Hematuria* topic was finalized. Using the search strategy described in the literature search companion (see the "Availability of Companion Documents" field), 83 articles were found. Ten articles were added to the bibliography. Seventy-three articles were not used due to either poor study design, the articles were not relevant or generalizable to the topic, the results were unclear, misinterpreted, or biased, or the articles were already cited in the original bibliography.

The author added 17 citations from bibliographies, Web sites, or books that were not found in the new literature search.

See also the American College of Radiology (ACR) Appropriateness Criteria® literature search process document (see the "Availability of Companion Documents" field) for further information.

Number of Source Documents

Of the 36 citations in the original bibliography, nine were retained in the final document. The new literature search conducted in March 2013 identified 10 articles that were added to the bibliography. The author added 17 citations from bibliographies, Web sites, or books that were not

found in the new literature search.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Study Quality Category Definitions

Category 1 - The study is well-designed and accounts for common biases.

Category 2 - The study is moderately well-designed and accounts for most common biases.

Category 3 - There are important study design limitations.

Category 4 - The study is not useful as primary evidence. The article may not be a clinical study or the study design is invalid, or conclusions are based on expert consensus. For example:

a. The study does not meet the criteria for or is not a hypothesis-based clinical study (e.g., a book chapter or case report or case series description).
b. The study may synthesize and draw conclusions about several studies such as a literature review article or book chapter but is not primary evidence.
c. The study is an expert opinion or consensus document.

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

The topic author assesses the literature then drafts or revises the narrative summarizing the evidence found in the literature. American College of Radiology (ACR) staff drafts an evidence table based on the analysis of the selected literature. These tables rate the study quality for each article included in the narrative.

The expert panel reviews the narrative, evidence table and the supporting literature for each of the topic-variant combinations and assigns an appropriateness rating for each procedure listed in the variant table(s). Each individual panel member assigns a rating based on his/her interpretation of the available evidence.

More information about the evidence table development process can be found in the ACR Appropriateness Criteria® Evidence Table Development documents (see the "Availability of Companion Documents" field).

Methods Used to Formulate the Recommendations

Expert Consensus (Delphi)

Description of Methods Used to Formulate the Recommendations

Rating Appropriateness

The American College of Radiology (ACR) Appropriateness Criteria (AC) methodology is based on the RAND Appropriateness Method. The appropriateness ratings for each of the procedures or treatments included in the AC topics are determined using a modified Delphi method. A

series of surveys are conducted to elicit each panelist's expert interpretation of the evidence, based on the available data, regarding the appropriateness of an imaging or therapeutic procedure for a specific clinical scenario. The expert panel members review the evidence presented and assess the risks or harms of doing the procedure balanced with the benefits of performing the procedure. The direct or indirect costs of a procedure are not considered as a risk or harm when determining appropriateness. When the evidence for a specific topic and variant is uncertain or incomplete, expert opinion may supplement the available evidence or may be the sole source for assessing the appropriateness.

The appropriateness is represented on an ordinal scale that uses integers from 1 to 9 grouped into three categories: 1, 2, or 3 are in the category "usually not appropriate" where the harms of doing the procedure outweigh the benefits; and 7, 8, or 9 are in the category "usually appropriate" where the benefits of doing a procedure outweigh the harms or risks. The middle category, designated "may be appropriate", is represented by 4, 5, or 6 on the scale. The middle category is when the risks and benefits are equivocal or unclear, the dispersion of the individual ratings from the group median rating is too large (i.e., disagreement), the evidence is contradictory or unclear, or there are special circumstances or subpopulations which could influence the risks or benefits that are embedded in the variant.

The ratings assigned by each panel member are presented in a table displaying the frequency distribution of the ratings without identifying which members provided any particular rating. To determine the panel's recommendation, the rating category that contains the median group rating without disagreement is selected. This may be determined after either the first or second rating round. If there is disagreement after the second rating round, the recommendation is "May be appropriate."

This modified Delphi method enables each panelist to articulate his or her individual interpretations of the evidence or expert opinion without excessive influence from fellow panelists in a simple, standardized and economical process. For additional information on the ratings process see the Rating Round Information document on the ACR Web site.

Additional methodology documents, including a more detailed explanation of the complete topic development process and all ACR AC topics can be found on the ACR Web site (see also the "Availability of Companion Documents" field).

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The recommendations are based on analysis of the current literature and expert panel consensus.

Summary of Evidence

Of the 36 references cited in the *ACR Appropriateness Criteria® Hematuria* document, 1 is categorized as a quality therapeutic study that may have design limitations. Additionally, 35 references are categorized as diagnostic references including 1 well-designed study, 6 good quality studies, and 10 quality studies that may have design limitations. There are 18 references that may not be useful as primary evidence.

While there are references that report on studies with design limitations, seven well-designed or good quality studies provide good evidence.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Selection of appropriate radiologic imaging procedures for evaluation of patients with hematuria

Potential Harms

Relative Radiation Level

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level (RRL) indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Patients in the pediatric age group are at inherently higher risk from exposure, both because of organ sensitivity and longer life expectancy (relevant to the long latency that appears to accompany radiation exposure). For these reasons, the RRL dose estimate ranges for pediatric examinations are lower as compared to those specified for adults. Additional information regarding radiation dose assessment for imaging examinations can be found in the ACR Appropriateness Criteria® Radiation Dose Assessment Introduction document (see the "Availability of Companion Documents" field).

Qualifying Statements

Qualifying Statements

The American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those examinations generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Staying Healthy

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

Shen L, Raman SS, Beland MD, Moreno CC, Goldfarb S, Harvin HJ, Heilbrun ME, Heller MT, Nikolaidis P, Preminger GM, Purysko AS, Taffel MT, Vikram R, Wang ZJ, Weinfeld RM, Yoo DC, Remer EM, Lockhart ME, Expert Panel on Urologic Imaging. ACR Appropriateness CriteriaÂ® hematuria [online publication]. Reston (VA): American College of Radiology (ACR); 2014. 8 p. [36 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

1995 (revised 2014)

Guideline Developer(s)

American College of Radiology - Medical Specialty Society

Source(s) of Funding

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

Guideline Committee

Committee on Appropriateness Criteria, Expert Panel on Urologic Imaging

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Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Ramchandani P, Kisler T, Francis IR, Casalino DD, Arellano RS, Baumgarten DA, Curry NS, Dighe M, Fulgham P, Israel GM, Leyendecker JR, Papanicolaou N, Prasad S, Remer EM, Sheth S, Expert Panel on Urologic Imaging. ACR Appropriateness Criteria® hematuria. [online publication]. Reston (VA): American College of Radiology (ACR); 2008. 5 p. [37 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Electronic copies: Available from the American College of Radiology (ACR) Web site .

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

Availability of Companion Documents

The following are available:

- ACR Appropriateness Criteria®. Overview. Reston (VA): American College of Radiology; 2015 Feb. 3 p. Electronic copies: Available in from the American College of Radiology (ACR) Web site .
- ACR Appropriateness Criteria®. Literature search process. Reston (VA): American College of Radiology; 2015 Feb. 1 p. Electronic copies: Available from the ACR Web site .
- ACR Appropriateness Criteria®. Evidence table development – diagnostic studies. Reston (VA): American College of Radiology; 2013 Nov. 3 p. Electronic copies: Available from the ACR Web site .
- ACR Appropriateness Criteria®. Evidence table development – therapeutic studies. Reston (VA): American College of Radiology; 2013 Nov. 4 p. Electronic copies: Available from the ACR Web site .
- ACR Appropriateness Criteria®. Radiation dose assessment introduction. Reston (VA): American College of Radiology; 2015 Feb. 3 p. Electronic copies: Available from the ACR Web site .
- ACR Appropriateness Criteria®. Procedure information. Reston (VA): American College of Radiology; 2015 Feb. 2 p. Electronic copies: Available from the ACR Web site .
- ACR Appropriateness Criteria® hematuria. Evidence table. Reston (VA): American College of Radiology; 2014. 14 p. Electronic copies: Available from the ACR Web site .
- ACR Appropriateness Criteria® hematuria. Literature search. Reston (VA): American College of Radiology; 2014. 1 p. Electronic copies: Available from the ACR Web site .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI on May 6, 2001. The information was verified by the guideline developer as of June 29, 2001. This summary was updated by ECRI on September 7, 2004. The updated information was verified by the guideline developer on October 8, 2004. This summary was updated by ECRI on February 7, 2006. This summary was updated by ECRI Institute on June 4, 2010. This summary was updated by ECRI Institute on January 13, 2011 following the U.S. Food and Drug Administration (FDA) advisory on gadolinium-based contrast agents. This summary was updated by ECRI Institute on July 29, 2015.

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